

What is claimed is:

[1] A non-vacuum process for the fabrication of an electronic and opto-electronic device based on organic semiconductors, said electronic and opto-electronic device comprising

a first electrode layer;

at least one organic semiconductor material layer; and

a second electrode layer

[2] A non-vacuum process as defined in Claim 1 wherein methods for fabrication of said first electrode layer and said second electrode layer are independently selected from a group of non-vacuum processing techniques including: electrochemical techniques and solution deposition techniques.

[3] A non-vacuum process as defined in Claim 1 wherein methods for fabrication of said first electrode layer and said second electrode layer are independently selected from a group of electrochemical processing techniques of electroless deposition and electrodeposition. Said electroless deposition and electrodeposition may be carried out in either aqueous phase or organic phase.

[4] A non-vacuum process as defined in Claim 1 wherein methods for fabrication of said first electrode layer and said second electrode layer are independently selected from a group of solution processing techniques of spin coating, ink-jet printing, thermal transfer printing and screen printing.

[5] A non-vacuum process as defined in Claim 1, wherein said first electrode layer is selected from a group of materials with low work functions, whereas said second electrode layer is selected from a group of materials with high work functions.

[6] A non-vacuum process as defined in Claim 1, wherein deposition of said electrode layers are performed in a chamber containing an inert gas and a reduction agent.

[7] A non-vacuum process as defined in Claim 1, further comprising a step of treating said electrode layers in a reducing atmosphere in order to minimize contents of oxygen and water.

[8] A non-vacuum process as defined in Claim 1 wherein methods for application said organic semiconductor layer are selected from a group of solution processing techniques of spin coating, screen printing, ink jet printing, thermal transfer printing, and others.

[9] A non-vacuum process as defined in Claim 1 further comprising a step of forming said device in a “layer by layer” mode, said layers in said electronic and opto-electronic device being deposited sequentially.

[10] A non-vacuum process as defined in Claim 1 further comprising a step of forming said device in a “layer to layer” mode by combining a first part and a second part. Said first part consisting of the first electrode coated with at least a layer of a first organic

semiconductor material, said second part consisting of the second electrode coated with at least a layer of a second organic semiconductor material. Said first part and second part being constructed separately and assembled by aligning and sticking said first part onto said second part. And sticking of said first part to second part is achieved by cross-linking said first organic semiconductor layer and said second organic semiconductor layer with assistance of heating, light or electron radiation.

[11] A non-vacuum process as defined in Claim 1, wherein said organic electronic and opto-electronic device being selected from a group of: organic light emitting diode, organic thin film transistor, organic solar cell, organic photodiode, organic memory chip, organic electronic circuit, and organic sensor.